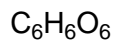
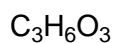
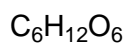
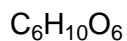


1.

Glucose is broken down in respiration.

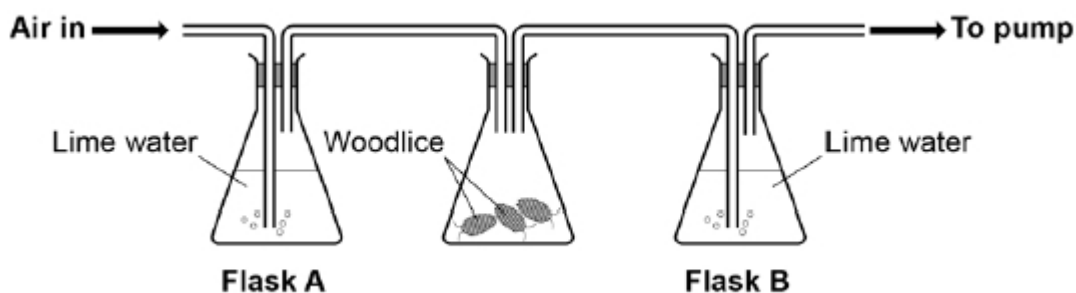
(a) What is the chemical formula for glucose?

Tick **one** box.


☐

☐

☐

☐

(1)

The diagram shows the apparatus a student used to investigate aerobic respiration.



Limewater goes cloudy when carbon dioxide is added to it.

(b) After 10 minutes the limewater in flask **B** was cloudy, but the limewater in flask **A** remained colourless.

Explain why.

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(2)

- (c) Flask **A** acts as a control in this investigation.

What is the purpose of a control?

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(1)

- (d) The student repeated the investigation with no woodlice.

Describe the appearance of the limewater in flask **A** and flask **B** after 10 minutes.

Flask **A** \_\_\_\_\_

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Flask **B** \_\_\_\_\_

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(2)

Anaerobic respiration is another form of respiration in living organisms.

- (e) What is produced during anaerobic respiration in humans?

Tick **one** box.

Carbon dioxide

☐

Carbon dioxide and lactic acid

☐

Lactic acid

☐

Oxygen and water

☐

(1)

- (f) Complete the equation for anaerobic respiration in yeast.

glucose      →      carbon dioxide      +      \_\_\_\_\_

(1)

(Total 8 marks)

2.

Anaerobic respiration happens in muscle cells and yeast cells.

The equation describes anaerobic respiration in muscle cells.



- (a) How can you tell from the equation that this process is anaerobic?

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(1)

- (b) Exercise **cannot** be sustained when anaerobic respiration takes place in muscle cells.

Explain why.

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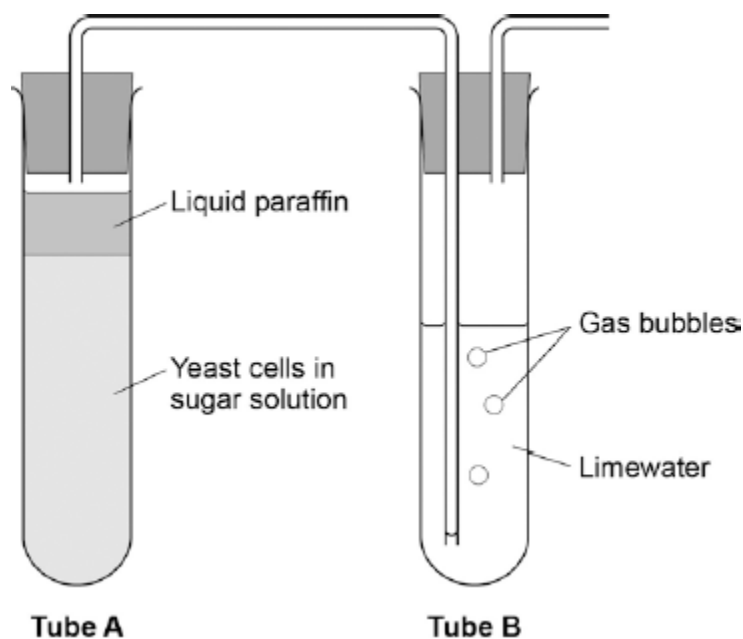
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(2)

(c) The diagram below shows an experiment to investigate **anaerobic** respiration in yeast cells.



What gas will bubble into Tube **B**?

Tick **one** box.

Carbon dioxide

☐

Nitrogen

☐

Oxygen

☐

Water vapour

☐

(1)

(d) Describe how you could use tube **B** to measure the rate of the reaction in tube **A**.

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(2)

- (e) Anaerobic respiration in yeast is also called fermentation.

Fermentation produces ethanol.

Give **one** use of fermentation in the food industry.

\_\_\_\_\_

(1)

(Total 7 marks)

3.

- (a) Use words from the box to complete the equation for aerobic respiration.

alcohol	glucose	lactic acid	water
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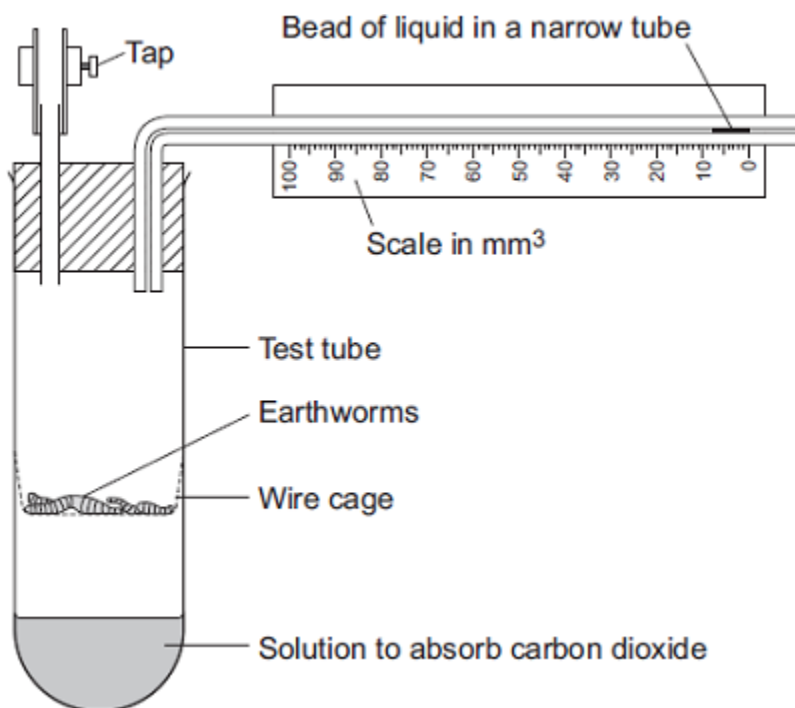
\_\_\_\_\_ + oxygen  $\longrightarrow$  carbon dioxide + \_\_\_\_\_ (+ energy)

(2)

(b) Some students investigated the effect of temperature on the rate of aerobic respiration in earthworms.

The diagram shows the apparatus the students used.

When the tap is closed, the bead of liquid moves to the left as the earthworms take in oxygen.



The students put the test tube into a water bath at 20°C for 10 minutes. They left the tap open during this time.

Why did the students put the test tube in the water bath at 20°C for 10 minutes?

Tick (✓) **one** box.

Because the air contains more oxygen at 20°C.

☐

Because the air contains less carbon dioxide at 20°C.

☐

So the earthworms' body temperature would change to 20°C.

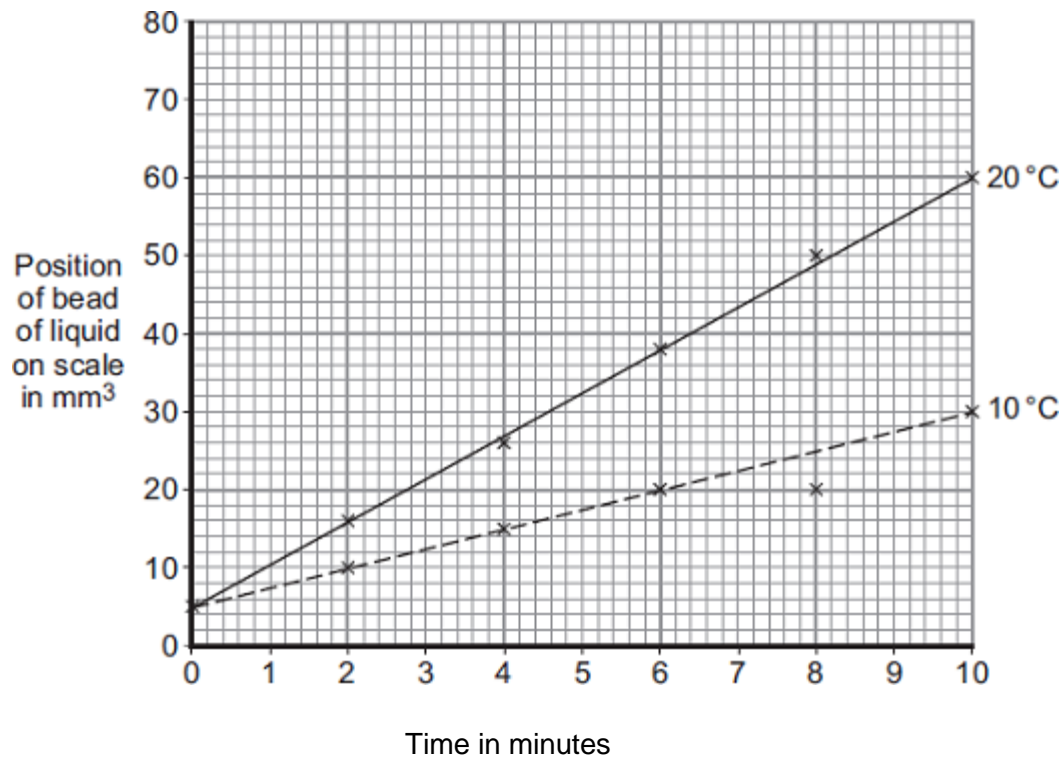
☐

(1)

(c) The students then:

- closed the tap
- started a stopwatch
- recorded the position of the bead of liquid every 2 minutes for 10 minutes
- repeated the experiment at 10°C.

The graph shows the students' results.



(i) How much oxygen did the earthworms take in during the 10 minutes at 20°C?

Use information from the graph to work out your answer.

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Volume of oxygen taken in = \_\_\_\_\_ mm³

(2)

- (ii) The earthworms took in this volume of oxygen in 10 minutes.

Use your answer from part (c)(i) to calculate how much oxygen the earthworms took in each minute.

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Volume of oxygen taken in = \_\_\_\_\_  $\text{mm}^3$  per minute

(1)

- (iii) The earthworms took in less oxygen each minute at  $10^\circ\text{C}$  than they took in at  $20^\circ\text{C}$ .

Explain why.

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(2)

- (d) When drawing the line on the graph for the experiment at  $10^\circ\text{C}$ , the students ignored the reading at 8 minutes.

- (i) Suggest why they ignored the reading at 8 minutes.

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(1)

- (ii) One student suggested they should repeat the experiment twice more at each temperature.

How would repeating the experiment improve the investigation?

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(1)

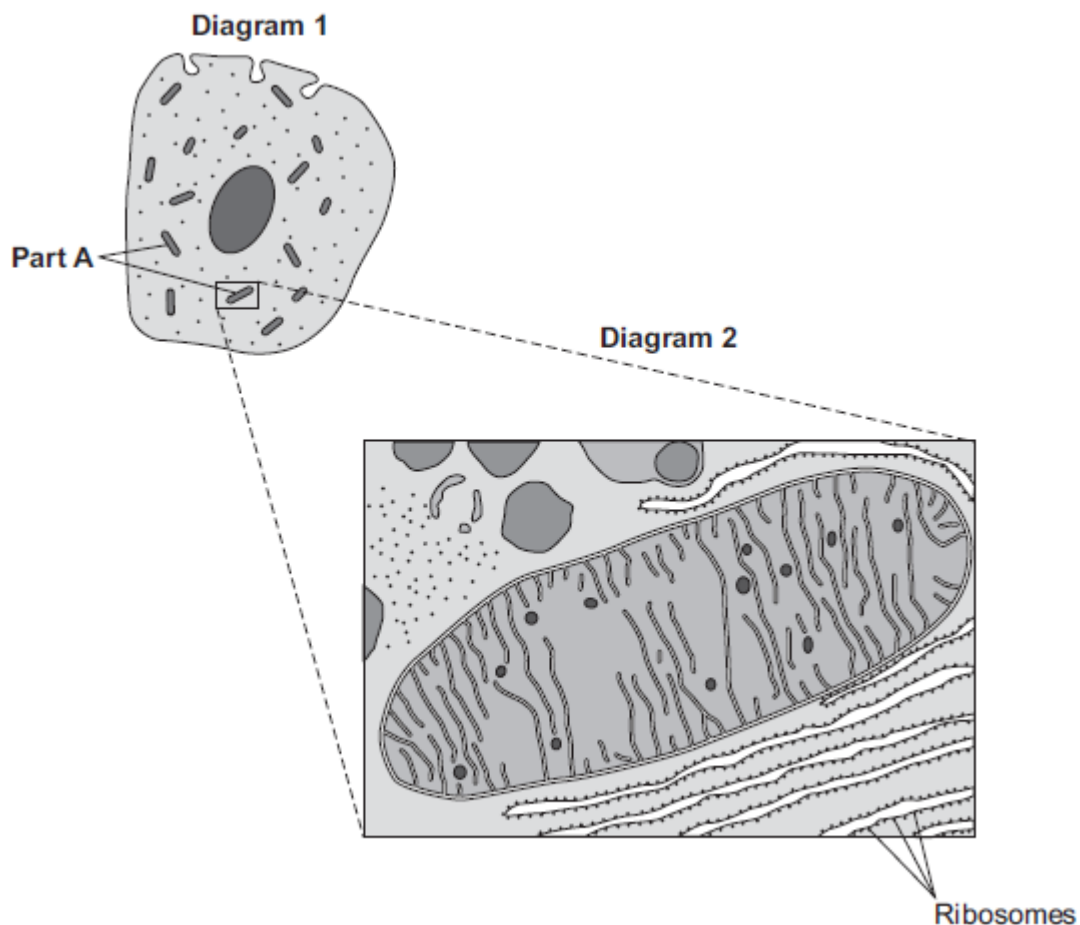
**(Total 10 marks)**



4.

Diagram 1 shows a cell from the pancreas.

Diagram 2 shows part of the cell seen under an electron microscope.



Part **A** is where most of the reactions of aerobic respiration happen.

(a) (i) Name part **A**.

\_\_\_\_\_

(1)

(ii) Complete the equation for aerobic respiration.

glucose + oxygen  $\longrightarrow$  \_\_\_\_\_ + \_\_\_\_\_ (+ energy)

(2)

(iii) Part **A** uses oxygen.

Explain how oxygen passes from the blood to part **A**.

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**(3)**

(b) The pancreas cell makes enzymes.

Enzymes are proteins.

Describe how the ribosomes and part **A** help the cell to make enzymes.

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**(3)**

**(Total 9 marks)**

5.

- (a) The table shows the effect of exercise on the action of one person's heart.

	At rest	During exercise
Heart rate in beats per minute	72	165
Volume of blood leaving the heart in each beat in $\text{cm}^3$	75	120
Heart output in $\text{cm}^3$ per minute	5400	

- (i) Calculate the heart output for this person during exercise.

Show clearly how you work out your answer.

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Answer = \_\_\_\_\_  $\text{cm}^3$  per minute

(2)

- (ii) During exercise, more oxygen is carried to the working muscles.

Explain why this is helpful during exercise.

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(2)

(b) Give **two** other changes in the body that help to increase the amount of oxygen delivered to the working muscles during exercise.

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

(2)

(Total 6 marks)